

CLAIMS

1. A prepreg comprising reinforcing fiber, a sheet-like reinforcing fiber substrate containing reinforcing fiber, and a matrix resin, wherein said matrix resin is impregnated
5 into said sheet-like reinforcing fiber substrate and also covers one surface of said sheet-like reinforcing fiber substrate, and a matrix resin impregnation ratio is within a range of 35% to 95%.
2. A prepreg comprising reinforcing fiber, a sheet-like reinforcing fiber substrate
10 containing reinforcing fiber, and a matrix resin, wherein said matrix resin exists on both surfaces of said sheet-like reinforcing fiber substrate, and a portion inside said sheet-like reinforcing fiber substrate into which said matrix resin has not been impregnated is continuous.
- 15 3. A prepreg comprising a sheet-like reinforcing fiber substrate formed from a reinforcing fiber woven fabric, and a matrix resin, wherein at least one surface displays a sea-and-island-type pattern comprising resin-impregnated portions (island portions) where said matrix resin is present at said surface, and fiber portions (sea portions) where
20 said matrix resin is not present at said surface, a surface coverage ratio of said matrix resin on surfaces with said sea-and-island-type pattern is within a range of 3% to 80%, and a weave intersection coverage ratio for said island portions, represented by a formula (1) shown below, is at least 40%:

$$\text{Island portions weave intersection coverage ratio (\%)} = (T/Y) \times 100 \quad (1)$$

(wherein, T represents a number of island portions that cover weave intersections, and Y represents a number of weave intersections within said reinforcing fiber woven fabric on said surface with said sea-and-island-type pattern).

5 4. A prepreg according to any one of claim 1 through claim 3, wherein said matrix resin is a thermosetting resin composition.

5. A prepreg according to claim 4, wherein said thermosetting resin composition is curable by holding at 90°C for 2 hours.

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6. A prepreg according to claim 4, wherein a minimum viscosity of said thermosetting resin composition is no more than 1000 poise.

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7. A prepreg according to claim 4, wherein said thermosetting resin composition comprises epoxy resin as a primary component.

8. A prepreg according to claim 4, wherein said thermosetting resin composition also contains a thermoplastic resin, and said thermoplastic resin is not dissolved within said thermosetting resin composition.

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9. A prepreg according to claim 8, wherein said thermoplastic resin comprises short fibers of thermoplastic resin with a length of 1 to 50 mm.

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10. A prepreg according to claim 9, wherein said short fibers of thermoplastic resin have a size of no more than 300 tex.

11. A prepreg according to any one of claim 1 through claim 3, wherein said reinforcing fibers are carbon fiber and/or glass fiber.
- 5 12. A prepreg according to any one of claim 1 through claim 3, wherein said sheet-like reinforcing fiber substrate has a fiber weight within a range of 200 g/m² to 1500 g/m².
13. A prepreg according to any one of claim 1 through claim 3, wherein said sheet-like reinforcing fiber substrate is in a form selected from the group consisting of
10 unidirectional materials, woven fabrics, knit fabrics, braided fabrics, mat materials, non-woven fabrics, and stitched sheets.
14. A prepreg according to any one of claim 1 through claim 3, wherein said sheet-like reinforcing fiber substrate has a thickness of at least 200 μm.
- 15 15. A process for producing a prepreg, comprising the steps of applying a matrix resin on a resin support sheet, bonding a matrix resin-coated surface of said resin support sheet to both surfaces of a sheet-like reinforcing fiber substrate, and pressing a laminate of said resin support sheets and said sheet-like reinforcing fiber substrate under
20 temperature conditions ranging from room temperature to 40°C in order to cause said matrix resin to impregnate said sheet-like reinforcing fiber substrate, thus forming a prepreg in which an interior of said sheet-like reinforcing fiber substrate comprises a continuous portion that has not been impregnated with said matrix resin.

16. A process for producing a prepreg, comprising the steps of applying a matrix resin on a resin support sheet, bonding a matrix resin-coated surface of said resin support sheet to one surface of a reinforcing fiber woven fabric, bonding a protective film to another surface of said reinforcing fiber woven fabric, subsequently applying heat and/or pressure in order to cause said matrix resin to impregnate said reinforcing fiber woven fabric, thus forming a prepreg in which a surface of said reinforcing fiber woven fabric facing said protective film displays a sea-and-island-pattern comprising resin-impregnated portions (island portions) where said matrix resin is present at said surface and fiber portions (sea portions) where said matrix resin is not present at said surface.

17. A process for producing a prepreg according to claim 16, wherein a thermosetting resin composition containing a thermoplastic resin that is not dissolved within said thermosetting resin composition is also applied uniformly to said matrix resin-coated surface.

18. An intermediate material for FRP molding comprising a prepreg containing reinforcing fibers and a matrix resin, and a substrate containing essentially no impregnated thermosetting resin composition, which is provided on at least one side surface of said prepreg, wherein a ratio (B)/(A) between a thickness (A) of said prepreg and a thickness (B) of said substrate is within a range of 0.1 to 2.5.

19. A prepreg according to claim 18, wherein said matrix resin is a thermosetting resin composition.

20. An intermediate material for FRP molding according to claim 18, wherein said substrate containing essentially no impregnated thermosetting resin composition contains a fibrous thermoplastic resin.

5 21. An intermediate material for FRP molding according to claim 18, wherein said substrate containing essentially no impregnated thermosetting resin composition is a non-woven cloth of a thermoplastic resin.

22. An intermediate material for FRP molding according to claim 18, wherein said
10 substrate containing essentially no impregnated thermosetting resin composition contains reinforcing fibers.

23. An intermediate material for FRP molding according to claim 22, wherein said reinforcing fibers are identical to said reinforcing fibers incorporated within said prepreg.

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24. An intermediate material for FRP molding according to claim 22, wherein said reinforcing fibers are positioned at a different angle to said reinforcing fibers incorporated within said prepreg.

20 25. An intermediate material for FRP molding according to claim 22, wherein said reinforcing fibers are different from said reinforcing fibers incorporated within said prepreg.

26. An intermediate material for FRP molding according to claim 18, wherein said
25 matrix resin is one of an epoxy resin composition and a phenol resin composition.

27. An intermediate material for FRP molding according to claim 18, wherein said reinforcing fibers incorporated within said prepreg are carbon fiber and/or glass fiber.

5 28. A process for producing an intermediate material for FRP molding, comprising the steps of preparing a prepreg using a lacquer-type process, and bonding a substrate containing essentially no impregnated thermosetting resin composition to at least one surface of said prepreg.

10 29. A process for producing a fiber-reinforced composite material, comprising the steps of laminating a prepreg according to any one of claim 1 through claim 3, and conducting molding using vacuum bag molding.

30. A process for producing a fiber-reinforced composite material, comprising the
15 steps of laminating an intermediate material for FRP molding according to claim 18, and conducting molding using vacuum bag molding.

31. A process for producing a fiber-reinforced composite material, wherein preregs according to any one of claim 1 through claim 3 are laminated with identical side
20 surfaces of said preregs facing to identical directions.

32. A process for producing a fiber-reinforced composite material, wherein an intermediate material for FRP molding according to claim 18 is laminated with identical side surfaces of said intermediate material facing to identical directions.

33. A process for producing a fiber-reinforced composite material according to claim 29, wherein in said vacuum bag molding process, primary curing is conducted for at least 10 minutes at a primary curing temperature of no more than 150°C, and molding is then conducted at a temperature that is equal to, or greater than, said primary curing
5 temperature.

34. A process for producing a fiber-reinforced composite material according to claim 31, wherein in said vacuum bag molding process, primary curing is conducted for at least 10 minutes at a primary curing temperature of no more than 150°C, and molding is then
10 conducted at a temperature that is equal to, or greater than, said primary curing temperature.

35. A process for producing a fiber-reinforced composite material according to claim 29, comprising the steps of deaerating said prepreg under conditions including a
15 temperature within a range of room temperature to 50°C, and a pressure of no more than 50 Torr, and conducting molding by raising temperature to a molding temperature, while said pressure is maintained at no more than 50 Torr.

36. A process for producing a fiber-reinforced composite material according to claim 35, wherein a rate of temperature increase during said raising of temperature to said
20 molding temperature is set to no more than 1°C/minute when it starts from a point at least 20°C below said molding temperature.